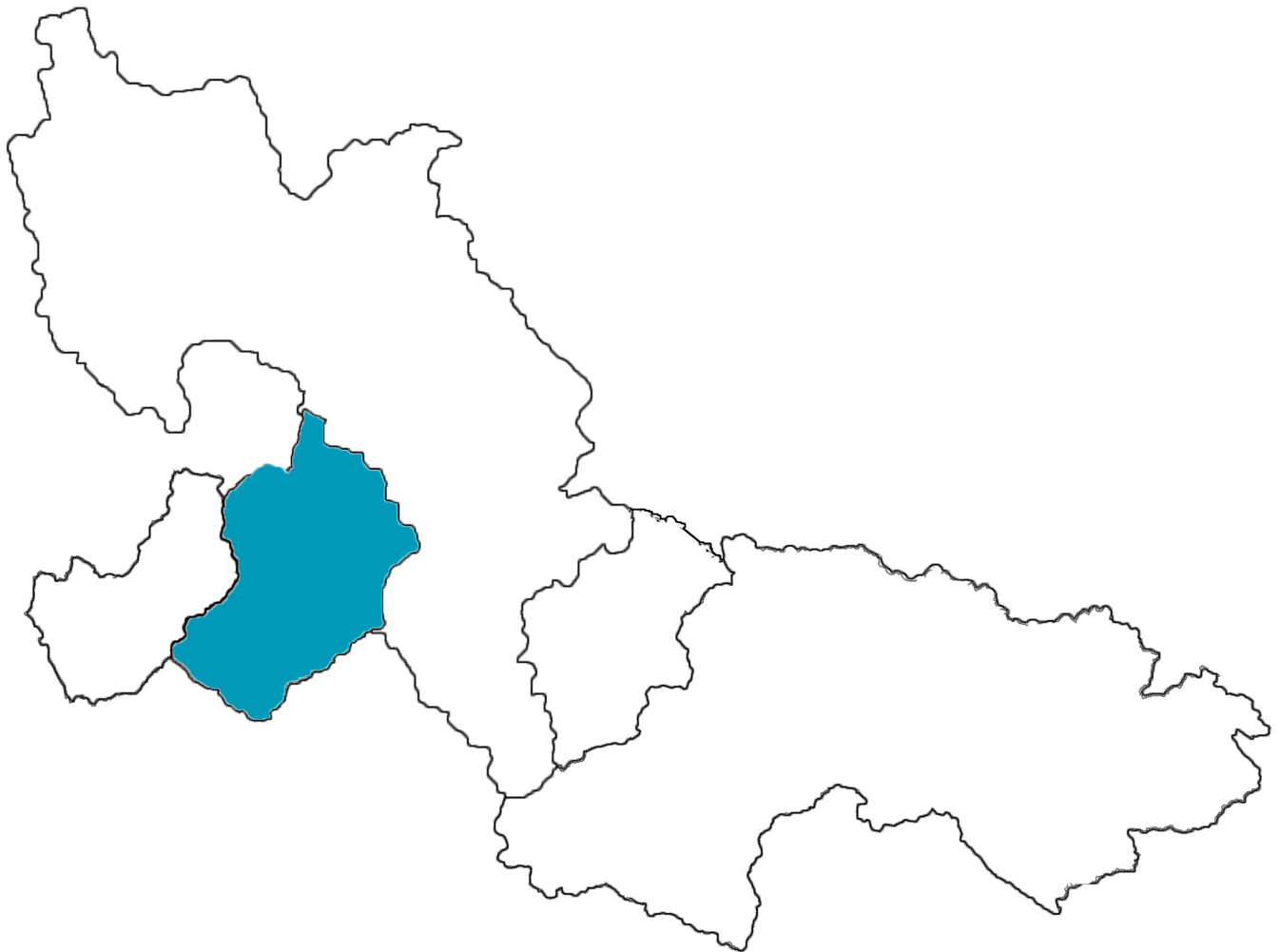


Section 5.1

Agua Fria Basin



5.1.1 Geography of the Agua Fria Basin

The Agua Fria Basin, located in the west central part of the planning area is 1,263 square miles in area. Geographic features and principal communities are shown on Figure 5.1-1. The basin is characterized by mid-elevation mountain ranges and mesas. Vegetation types include Sonoran desertscrub, semidesert grassland, chaparral and montane conifer forests. Riparian vegetation is found along the Agua Fria River including mixed broadleaf and cottonwood/willow.

- Principal geographic features shown on Figure 5.1-1 are:
 - Principal basin communities of Black Canyon City and Cordes Junction
 - Other communities of Castle Hot Springs, Crown King and Mayer
 - Agua Fria River running north to south through the center of the basin
 - The lowest point in the basin is about 3,700 feet along the Agua Fria River
 - Numerous creeks that flow into the Agua Fria River. In the southern half of the basin these creeks include Castle Creek, Humbug Creek, Cottonwood Creek, Black Canyon Creek and Squaw Creek. In the northern half of the basin these creeks include Turkey Creek, Silver Creek, Sycamore Creek, Yellow Jacket Creek and Ash Creek
 - Horsethief Basin southeast of Crown King
 - Perry Mesa to the east of Interstate 17 north of Black Canyon City
 - Black Mesa along Interstate 17 west of Perry Mesa
 - Big Bug Mesa on the western basin boundary northwest of Mayer
 - Buckhorn Mountains in the southwestern portion of the basin
 - Bradshaw Mountains west of Interstate 17, which contain the highest point in the basin, Mt. Union at 7,528 feet
- Not well shown on Figure 5.1-1 are the New River Mountains in the southeastern portion of the basin



Figure 5.1-1
Agua Fria Basin
Geographic Features

Base Map: USGS 1:500,000, 1981

5.1.2 Land Ownership in the Agua Fria Basin

Land ownership, including the percentage of ownership by category, for the Agua Fria Basin is shown in Figure 5.1-2. Principal features of land ownership in this basin are the diversity of land ownership types and the large contiguous parcels of forest service lands. A description of land ownership data sources and methods is found in Volume 1, Section 1.3.8. Land ownership categories are discussed below in the order of percentage from largest to smallest in the basin.

National Forest and Wilderness

- 46.7% of the land is federally owned and managed as National Forest and Wilderness.
- Forest lands in the basin are part of the Prescott and Tonto National Forests.
- The basin contains two wilderness areas, the 25,536-acre Castle Creek Wilderness and the 20,100-acre Pine Mountain Wilderness. Both areas are in the Prescott National Forest.
- There are numerous small private in-holdings in the Prescott National Forest.
- National forest land is located in the northern, eastern and western portions of the basin, divided by Interstate 17 and other land uses in the central part of the basin.
- Land uses include recreation, grazing and timber production.

U.S. Bureau of Land Management (BLM)

- 16.7% of the land is federally owned and managed by the Hassayampa Field Office Bureau of Land Management.
- Most BLM lands are interspersed with private and state trust lands in the southern and central portions of the basin.
- Primary land uses are recreation and grazing.

State Trust Land

- 14.6% of the land in this basin is held in trust for the public schools and four other beneficiaries under the State Trust Land system.
- State land is interspersed with private and BLM lands and is found in the southern and north-central portions of the basin.
- Primary land use is grazing.

National Parks, Monuments and Recreation Areas

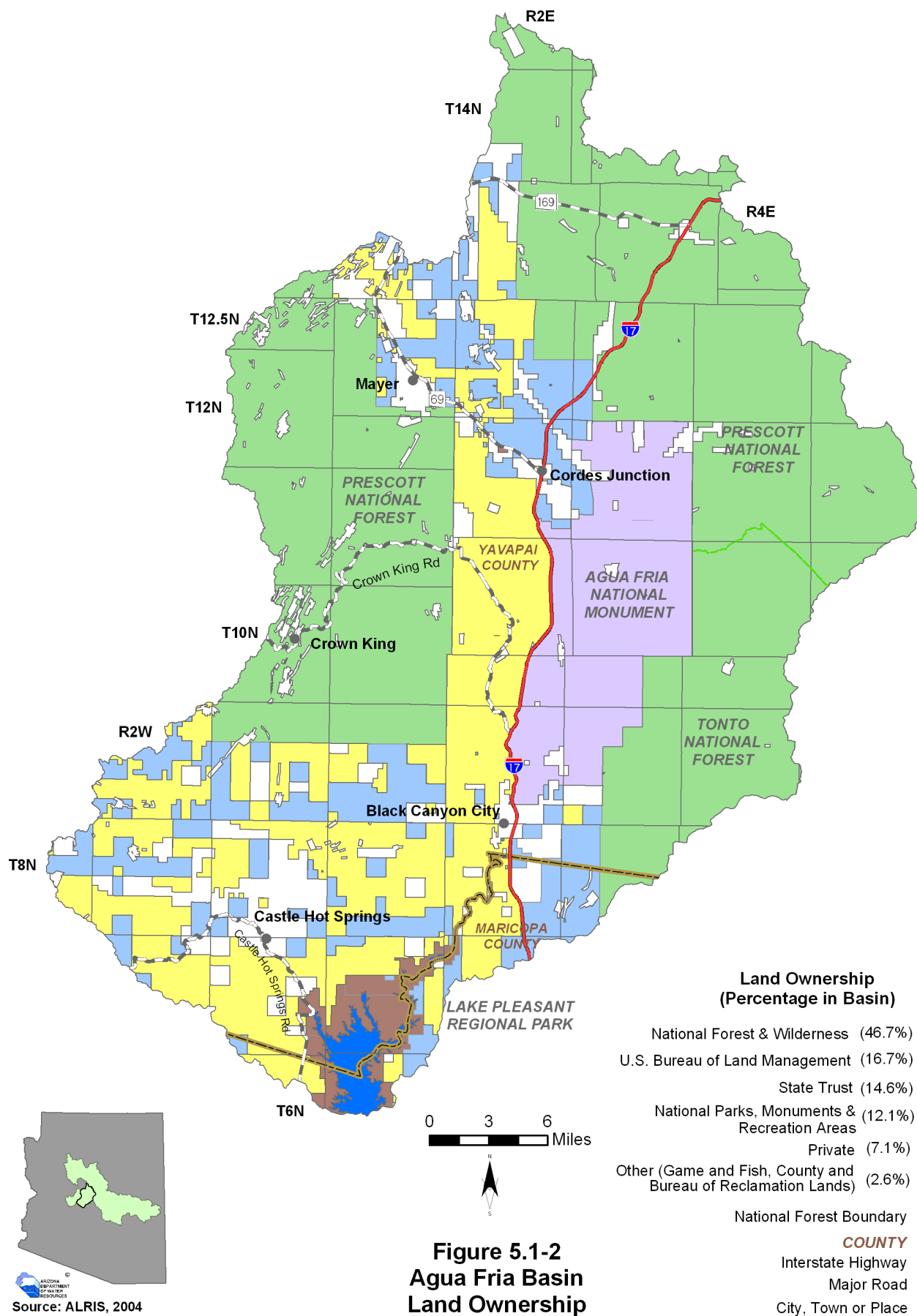
- 12.1% of the land (71,000 acres) is federally owned and managed by the BLM as the Agua Fria National Monument located in the center of the basin.
- Primary land use is recreation.

Private

- 7.1% of the land is private.
- Private land is found throughout the basin with the majority of the private land interspersed with state trust, national forest and BLM lands.
- The largest contiguous area of private lands is in the vicinity of Castle Hot Springs.
- Land uses include domestic, commercial and ranching.

Other (Game and Fish, County and Bureau of Reclamation Lands)

- 2.6% of the land is owned and managed by two counties.
- The largest portion of “other” land is owned and managed by Maricopa County as the Lake Pleasant Regional Park. This park is located at the southernmost tip of the basin.
- A small portion of land northeast of Cordes Junction is owned by Yavapai County, its use is unknown.
- Primary land use at the Lake Pleasant Regional Park is recreation.



**Figure 5.1-2
Agua Fria Basin
Land Ownership**

Source: ALRIS, 2004
Bureau of Land Management, 1999

5.1.3 Climate of the Agua Fria Basin

Climate data from NOAA/NWS Co-op Network stations are compiled in Table 5.1-1 and the locations are shown on Figure 5.1-3. Figure 5.1-3 also shows precipitation contour data from the Spatial Climate Analysis Service (SCAS) at Oregon State University. The Agua Fria Basin does not contain Evaporation Pan, AZMET or SNOTEL/Snowcourse stations. A description of the climate data sources and methods is found in Volume 1, Section 1.3.3.

NOAA/NWS Co-op Network

- Refer to Table 5.1-1A
- Elevations at the three NOAA/NWS Co-op network climate stations range from 1,990 feet to 5,920 feet.
- Minimum average temperature ranges from 37.4°F at Crown King to 53.2°F at Castle Hot Springs.
- Maximum average temperature ranges from 88.8°F at Castle Hot Springs to 72.6°F at Crown King.
- Station precipitation is similar at the Castle Hot Springs and Cordes stations with an average annual precipitation of 15.47 inches and 16.21 inches respectively. Annual average precipitation is 28.41 inches at Crown King.
- All stations report highest average seasonal rainfall in the winter season (January - March) and lowest seasonal rainfall in the spring.

SCAS Precipitation Data

- See Figure 5.1-3
- Additional precipitation data shows rainfall as high as 32 inches south of Crown King and as low as 10 inches at the southernmost tip of the basin.
- In general, precipitation increases as altitude increases in this basin. The range of 22 inches between areas of highest and lowest precipitation is common for the planning area.

Table 5.1-1 Climate Data for the Agua Fria Basin

A. NOAA/NWS Co-op Network:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Average Temperature Range (in F)		Average Total Precipitation (in inches)				
			Max/Month	Min/Month	Winter	Spring	Summer	Fall	Annual
Castle Hot Springs	1,990	1971 - 2000	88.8/Jul	53.2/Jan	6.23	1.03	4.52	3.69	15.47
Cordes	3,770	1971 - 2000	80.1/Jul	45.3/Jan	5.29	1.31	5.87	3.74	16.21
Crown King	5,920	1971 - 2000	72.6/Jul	37.4/Jan	11.39	2.13	8.62	6.27	28.41

Source: WRCC, 2003.

B. Evaporation Pan:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Avg. Annual Evap (in inches)
None			

Source: WRCC, 2003.

C. AZMET:

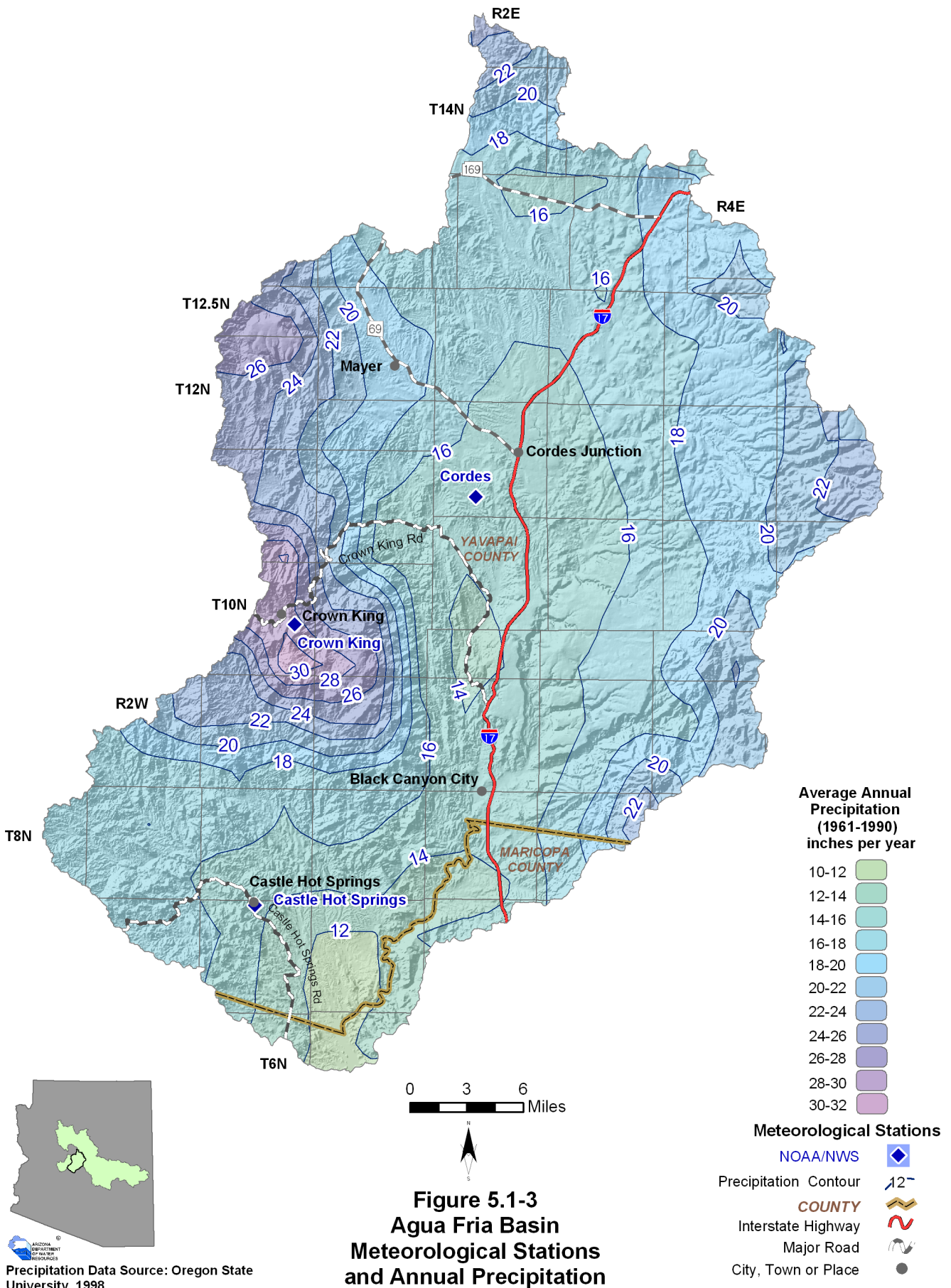
Station Name	Elevation (in feet)	Period of Record	Average Annual Reference Evapotranspiration, in inches (Number of years to calculate averages)
None			

Source: Arizona Meteorological Network, 2005

D. SNOTEL/Snowcourse:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Average Snowpack, at Beginning of the Month, as Inches Snow Water Content (Number of measurements to calculate average)					
			Jan.	Feb.	March	April	May	June
None								

Source: NRCS, 2005



5.1.4 Surface Water Conditions in the Agua Fria Basin

Streamflow data, including average seasonal flow, average annual flow and other information is shown in Table 5.1-2. Flood ALERT equipment in the basin is shown in Table 5.1-3. Reservoir and stockpond data, including maximum storage or maximum surface area, are shown in Table 5.1-4. The location of streamflow gages identified by USGS number, flood ALERT equipment and USGS runoff contours are shown on Figure 5.3-4. A description of stream data sources and methods is found in Volume 1, Section 1.3.16. A description of reservoir data sources and methods is found in Volume 1, Section 1.3.11. A description of stockpond data sources and methods is found in Volume 1, Section 1.3.15.

Streamflow Data

- Refer to Table 5.1-2.
- Data from seven stations located at five watercourses including the Agua Fria River, Turkey Creek, Boulder Creek, Humbug Creek and Cottonwood Creek, are shown in the table and on Figure 5.1-4. Four of the seven stations were discontinued between 1992-1994. The remaining three stations, all located on the Agua Fria River, are real-time stations.
- The average seasonal flow at six stations is highest in the winter (January-March) when between 52% and 82% of the annual average annual flow occurs. The average seasonal flow at the Agua Fria near Humboldt station is highest in the summer (July-September) when 40% of the average annual flow occurs. Lowest average seasonal flow is in the spring (April-June) or summer (July-Sept).
- Maximum annual flows range from 360,541 acre-feet (1992, Agua Fria near Rock Springs) to 1,166 acre-feet (1992, Cottonwood Creek near Waddell Dam).
- Minimum annual flows range from 12 acre-feet (1989, Cottonwood Creek near Waddell Dam) to 1,528 acre-feet (1975, Agua Fria River near Rock Springs).

Flood ALERT Equipment

- Refer to Table 5.1-3.
- As of October 2005 there were 14 stations in the basin. All stations are located in Yavapai County, however, all but two stations are the responsibility of the Maricopa County Flood Control District.
- Of the 14 stations, 11 are precipitation only stations, two are weather stations and one is a repeater/weather station.

Reservoirs and Stockponds

- Refer to Table 5.1-4.
- The basin contains one large reservoir with a maximum capacity of 1,108,600 acre-feet. Lake Pleasant, created by the New Waddell Dam, is used for flood control, hydroelectric power generation, recreation and water supply purposes.
- Surface water is stored or could be stored in four small reservoirs in the basin.
- Total maximum storage for the two small reservoirs with greater than 15 acre-feet and less than 500 acre-feet capacity is 63 acre-feet. The total surface area for the remaining two small reservoirs is 13 acres.
- There are 527 registered stockponds in this basin.

Runoff Contour

- Refer to Figure 5.1-4.
- Average annual runoff is one inch per year in most of the basin and increases to two inches per year in the northeast portion of the basin.

Table 5.1-2 Streamflow Data for Agua Fria Basin

Station Number	USGS Station Name	Drainage Area (in mi ²)	Mean Basin Elevation (in feet)	Period of Record	Average Seasonal Flow (% of annual flow)				Annual Flow/Year (in acre-feet)				Years of Record
					Winter	Spring	Summer	Fall	Minimum	Median	Mean	Maximum	
9512450	Agua Fria River near Humboldt	Undetermined	NA	1/2000-current (real-time)	19	9	40	32	1,332 (2003)	1,354	2,013	3,352 (2002)	3
9512500	Agua Fria River near Mayer	585	5,000	1/1940-current (real-time)	52	9	22	17	976 (1962)	9,197	16,327	103,555 (1993)	63
9512600	Turkey Creek near Cleator	89	5,360	10/1979 - 9/1992, (discontinued)	68	10	9	12	239 (1981)	4,164	8,154	33,882 (1980)	12
9512800	Agua Fria River near Rock Springs	1,111	4,770	1/1970-current (real-time)	75	7	7	11	1,528 (1975)	19,692	57,664	360,541 (1992)	31
9512830	Boulder Creek near Rock Springs	38	NA	5/1983-9/1993 (discontinued)	80	9	3	9	14 (1989)	701	1,186	3,869 (1992)	9
9512860	Humbug Creek near Castle Hot Springs	60	NA	5/1983-9/1994 (discontinued)	81	7	5	7	333 (1989)	1,948	5,334	34,896 (1993)	10
9512970	Cottonwood Creek near Waddell Dam	9	NA	4/1983-3/1993 (discontinued)	82	1	13	4	12 (1989)	94	252	1,166 (1992)	9

Sources: USGS NWIS, USGS 1998 and USGS 2003.

Notes:

Statistics based on Calendar Year
Annual Flow statistics based on monthly values
Summation of Average Annual Flows may not equal 100 due to rounding.
Period of record may not equal Years of Record used for annual Flow/Year statistics due to only using years with a 12 month record

Table 5.1-3 Flood ALERT Equipment in the Agua Fria Basin

Station ID	Station Name	Station Type	Install Date	Responsibility
3755	Brooklyn Peak	Precipitation	8/3/2005	Yavapai County FCD
3780	Black Canyon City	Repeater/Weather Station	8/1/2005	Yavapai County FCD
5335	Minnehaha	Precipitation	6/16/1981	Maricopa County FCD
5660	Lake Pleasant North	Weather Station	NA	Maricopa County FCD
5670	Garfias Mountain	Precipitation	8/14/1981	Maricopa County FCD
5685	Columbia Hill	Precipitation	7/1/1981	Maricopa County FCD
5700	Horsethief Basin	Weather Station	11/24/1986	Maricopa County FCD
5715	Crown King	Precipitation	10/18/1982	Maricopa County FCD
5730	Sunset Point	Precipitation	7/1/1981	Maricopa County FCD
5745	Horseshoe Ranch	Precipitation	5/1/1981	Maricopa County FCD
5760	Horner Mtn. Ranch	Precipitation	4/1/1981	Maricopa County FCD
5775	Arizona Hunt Club	Precipitation	4/1/1981	Maricopa County FCD
5790	I-17 @ 169	Precipitation	11/11/1987	Maricopa County FCD
5805	Dewey	Precipitation	11/1/1981	Maricopa County FCD

FCD = Flood Control District

NA = Data not currently available to ADWR

Table 5.1-4 Reservoirs and Stockponds in the Agua Fria Basin

A. Large Reservoirs (500 acre-feet capacity and greater)

MAP KEY	RESERVOIR/LAKE NAME (Name of dam, if different)	OWNER/OPERATOR	MAXIMUM STORAGE (AF)	USE ¹	JURISDICTION
None	Lake Pleasant (New Waddell Dam) ²	Bureau of Reclamation	1,108,600	C,H,R,S	Federal

Source: US Army Corps of Engineers 2005, US Bureau of Reclamation 2007 and others

B. Other Large Reservoirs (50 acre surface area or greater)

MAP KEY	RESERVOIR/LAKE NAME (Name of dam, if different)	OWNER/OPERATOR	MAXIMUM SURFACE AREA (acres)	USE	JURISDICTION
None identified by ADWR at this time					

C. Small Reservoirs (greater than 15 acre-feet and less than 500 acre-feet capacity)

Total Number: 2

Total maximum storage : 63

D. Other Small Reservoirs (between 5 and 50 acres surface area)²

Total Number: 2

Total surface area: 13

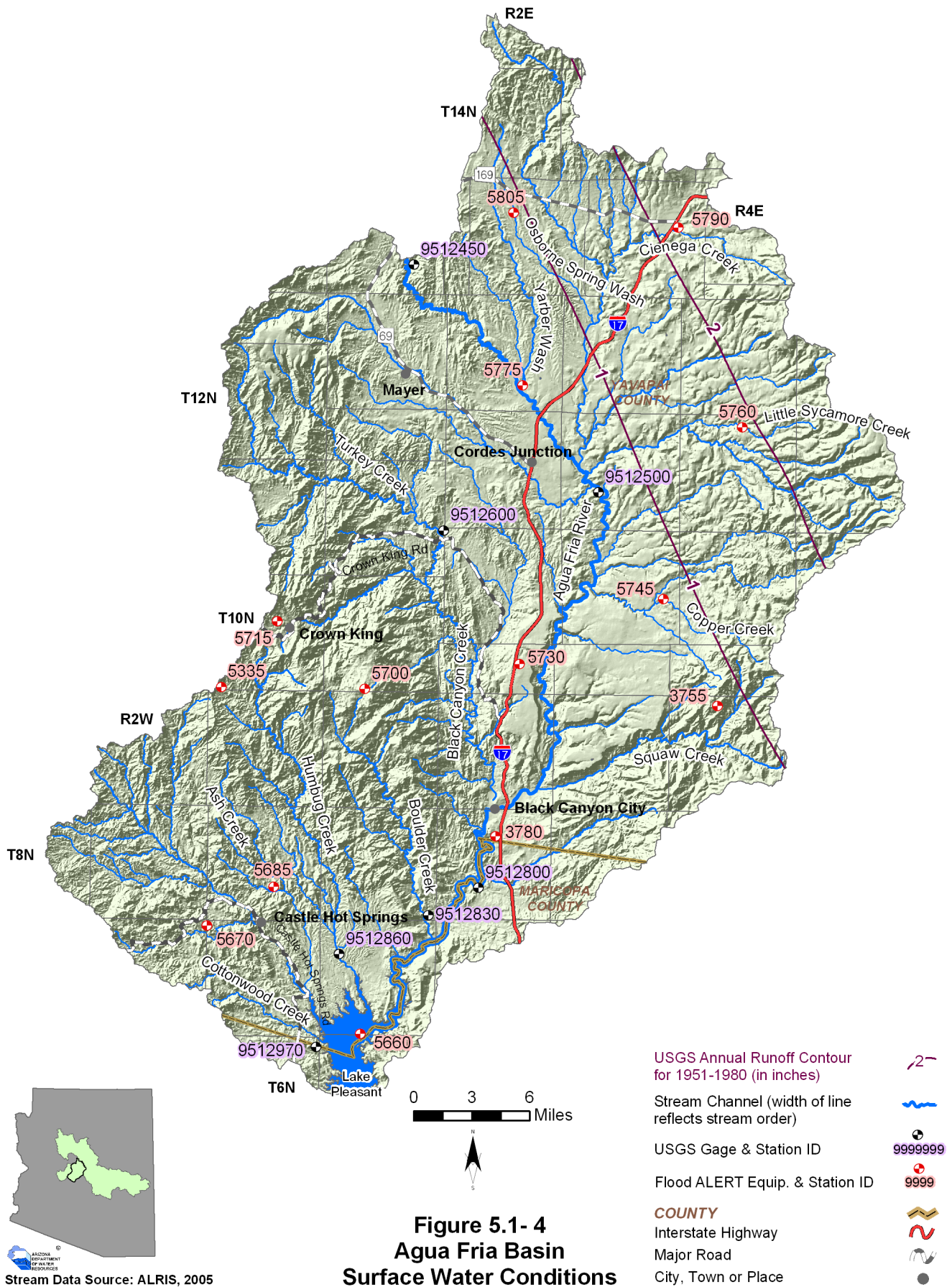
E. Stockponds (up to 15 acre-feet capacity)

Total number: 527 (from water right filings)

Notes:

¹C=Flood Control; H=hydroelectric; R=recreation; S=water supply

²Dam is located in the Phoenix AMA but lake storage is in the Agua Fria Basin



5.1.5 Perennial/Intermittent Streams and Major Springs in the Agua Fria Basin

Major and minor springs with discharge rates and date of measurement, and the total number of springs in the basin are shown in Table 5.1-5. The locations of major springs and perennial and intermittent streams are shown on Figure 5.1-5. A description of data sources and methods for intermittent and perennial reaches is found in Volume 1, 1.3.16. A description of spring data sources and methods is found in Volume 1, Section 1.3.14.

- Perennial streams in this basin include the Agua Fria River, Ash Creek, Sycamore Creek, Indian Creek, Silver Creek, a small reach of Humbug Creek, Yellow Jacket Creek and Grapevine Creek. Most perennial streams are in the northern portion of the basin.
- A number of intermittent streams are located throughout the basin.
- All perennial streams also have intermittent reaches.
- There are five major springs with a measured discharge of 10 gallons per minute (gpm) or greater at any time.
- Listed discharge rates may not be indicative of current conditions. All of the measurements were taken during or prior to 1982.
- All but one major spring is found in the central eastern portion of the basin. The greatest discharge rate was measured near Castle Hot Springs (Castle, 340 gpm) in the southern part of the basin.
- All but one of the major springs has a measured discharge rate of less than 100 gpm.
- Springs with measured discharge of 1 to 10 gpm are not mapped but coordinates are given in Table 5.1-5B. There are 14 minor springs identified in this basin.
- The total number of springs, regardless of discharge, identified by the USGS varies from 294 to 297, depending on the database reference.

Table 5.1-5 Springs in the Agua Fria Basin

A. Major Springs (10 gpm or greater):

Map Key	Name	Location		Discharge (in gpm) ¹	Date Discharge Measured
		Latitude	Longitude		
1	Castle	335908	1122134	340	During or prior to 1982
2	Nelson Place	341913	1114946	96	6/5/1981
3	Bee House	341846	1114945	50	12/13/1980
4	Brown	342302	1120049	40	8/31/1978
5	Willow	342119	1115343	14	10/23/1980

B. Minor Springs (1 to 10 gpm):

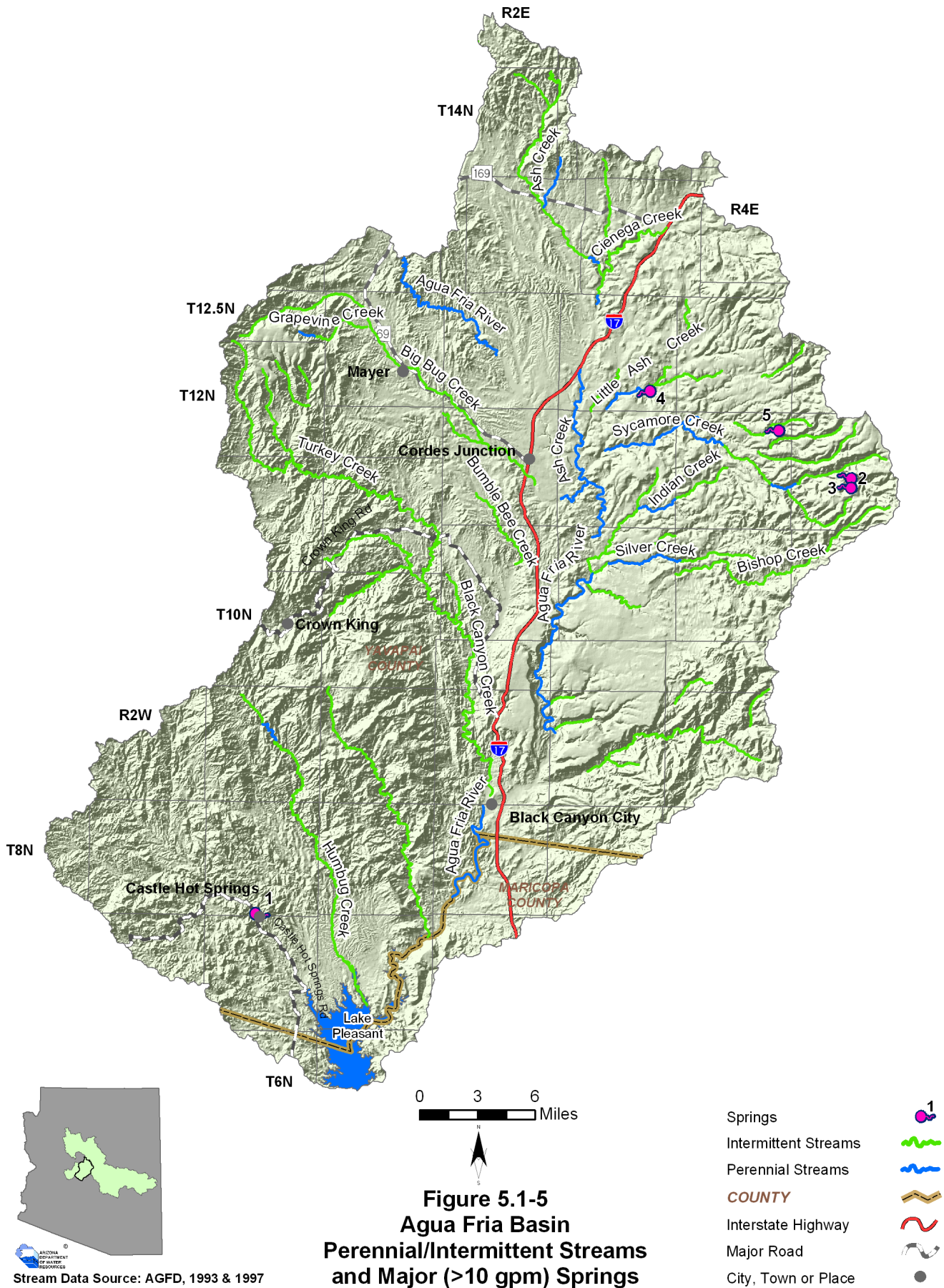
Name	Location		Discharge (in gpm) ¹	Date Discharge Measured
	Latitude	Longitude		
Coyote	341800	1120248	6	9/16/1993
Larry Canyon ²	340821	1120331	6	Not available
Unnamed	342905	1126121	5	10/20/1978
Sombero Canyon	341753	1115945	5	9/9/1993
Sheep	341800	1120220	3	9/1993
Alkali	335933	1122212	3	6/22/1979
Charlie's	342002	1120230	3	9/28/1993
Government ²	342742	1120146	2	9/5/1978
Silver Creek	341515	1120146	2	8/1993
Badger	341356	1120633	2	4/9/1998
Unnamed	335558	1122126	1	8/9/1979
Unnamed	342857	1121704	1	10/20/1978
Unnamed	335559	1122124	1	8/9/1979
Little	342108	1120524	1	9/1985
Bear Creek	340627	1120727	1	During or prior to 2004

C. Total number of springs, regardless of discharge, identified by USGS (see ALRIS, 2005 and NHD, 2006): 294 to 297

Notes:

¹Most recent measurement identified by ADWR

²Spring is not displayed on current USGS topo maps



5.1.6 Groundwater Conditions of the Agua Fria Basin

Major aquifers, well yields, estimated natural recharge, estimated water in storage, number of index wells and date of last water-level sweep are shown in Table 5.1-6. Figure 5.1-6 shows aquifer flow direction and water-level change between 1990-1991 and 2003-2004. Figure 5.1-7 contains hydrographs for selected wells shown on Figure 5.1-6. Figure 5.1-8 shows well yields in four yield categories. A description of aquifer data sources and methods is found in Volume 1, Section 1.3.2. A description of well data sources and methods, including water-level changes and well yields, is found in Volume 1, Section 1.3.19.

Major Aquifers

- Refer to Table 5.1-6 and Figure 5.1-6.
- Major aquifers in the basin include basin fill and sedimentary rock (conglomerate).
- Flow direction is generally from the north to the south from the basin boundaries toward the center of the basin.

Well Yields

- Refer to Table 5.1-6 and Figure 5.1-8.
- As shown on Figure 5.1-8 well yields in this basin range from less than 100 gallons per minute (gpm) to 2,000 gpm at several locations.
- One source of well yield information, based on 49 reported wells, indicates that the median well yield in this basin is 300 gpm.
- Well yields vary throughout the basin, with a cluster of less than 100 gallons per minute yields in the vicinity of Mayer.

Natural Recharge

- Refer to Table 5.1-6.
- The estimate of natural recharge for this basin is 9,000 acre-feet per year.

Water in Storage

- Refer to Table 5.1-6.
- There are two storage estimates for this basin, ranging from 620,000 acre-feet to a depth of 1,200 feet, to a more recent estimate from a 1994 ADWR study of 3.5 million acre-feet to an unknown depth.
- The predevelopment storage estimate is three million acre-feet to a depth of 1,200 acre-feet.

Water Level

- Refer to Figure 5.1-6. Water levels are shown for wells measured in 2003-2004.
- The Department annually measures seven index wells in this basin.
- In 1979, the year of the last water level sweep, 49 wells were measured.
- The deepest recorded water level in the basin is 462 feet near Interstate 17 north of Black Canyon City and the shallowest is 21 feet east of Mayer.
- There is one ADWR automated groundwater level monitoring device located near.
- Hydrographs corresponding to selected wells shown on Figure 5.1-6 but covering a longer time period are shown in Figure 5.1-7.

Table 5.1-6 Groundwater Data for the Agua Fria Basin

Basin Area, in square miles:	1,263	
Major Aquifer(s):	Name and/or Geologic Units	
	Basin Fill	
	Sedimentary Rock (Conglomerate)	
Well Yields, in gal/min:	Range 210-625 (2 wells measured)	Measured by ADWR and/or USGS
	Range 5-1,500 Median 300 (49 wells reported)	Reported on registration forms for large (> 10-inch) diameter wells
	Range 30-300	ADWR (1990)
	Range 0-500	USGS (1994)
Estimated Natural Recharge, in acre-feet/year:	9,000	Freethy and Anderson (1986)
Estimated Water in Currently in Storage, in acre-feet:	620,000 - 3,500,000 (1990 to 1,200 ft, 1994 depth N/A)	ADWR (1990 and 1994)
	3,000,000 ¹ (to 1,200 ft)	Freethy and Anderson (1986)
	N/A	Arizona Water Commission (1975)
Current Number of Index Wells:	7	
Date of Last Water-level Sweep:	1979 (49 wells measured)	

¹ Predevelopment Estimate

N/A not available

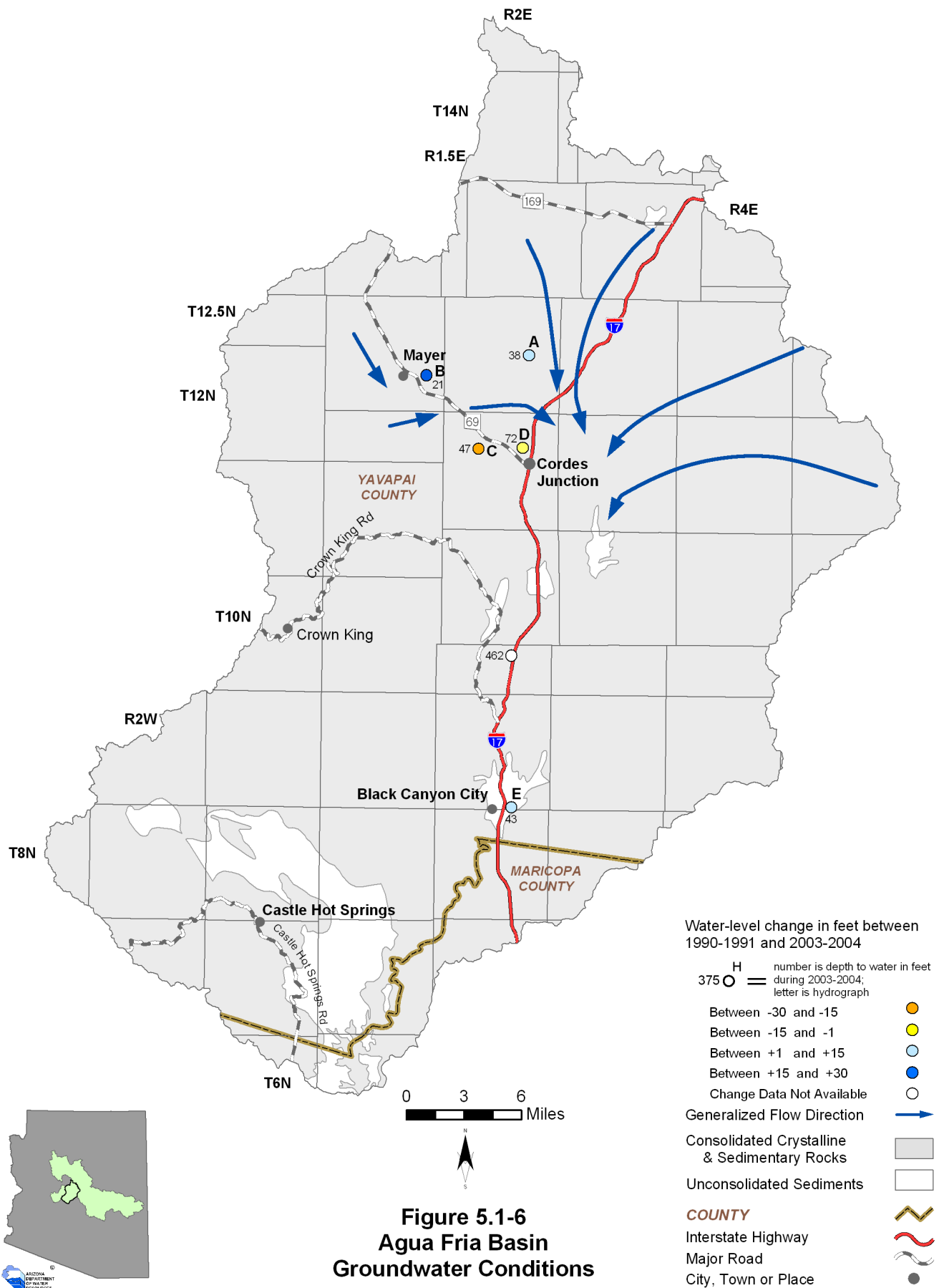
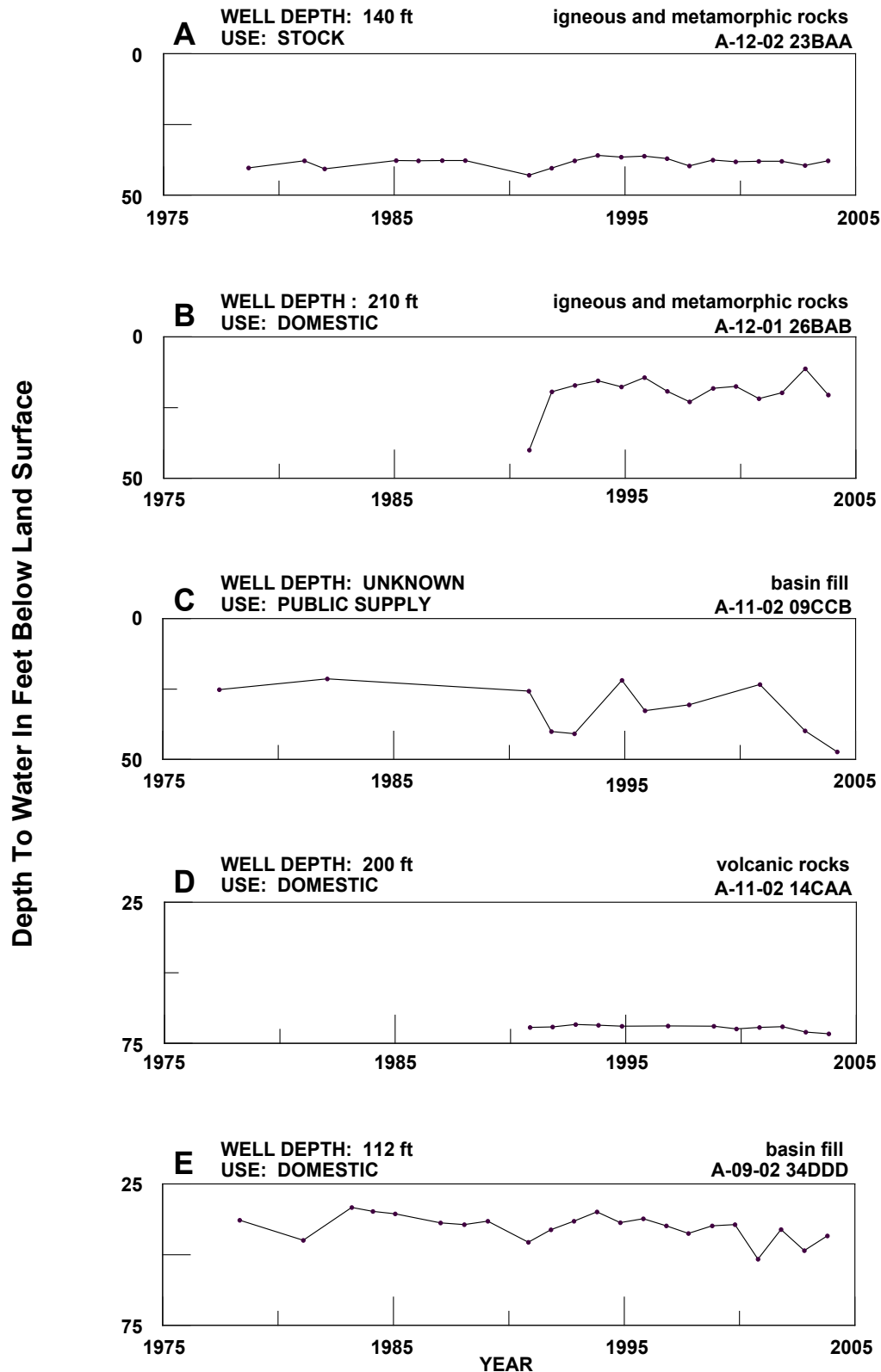
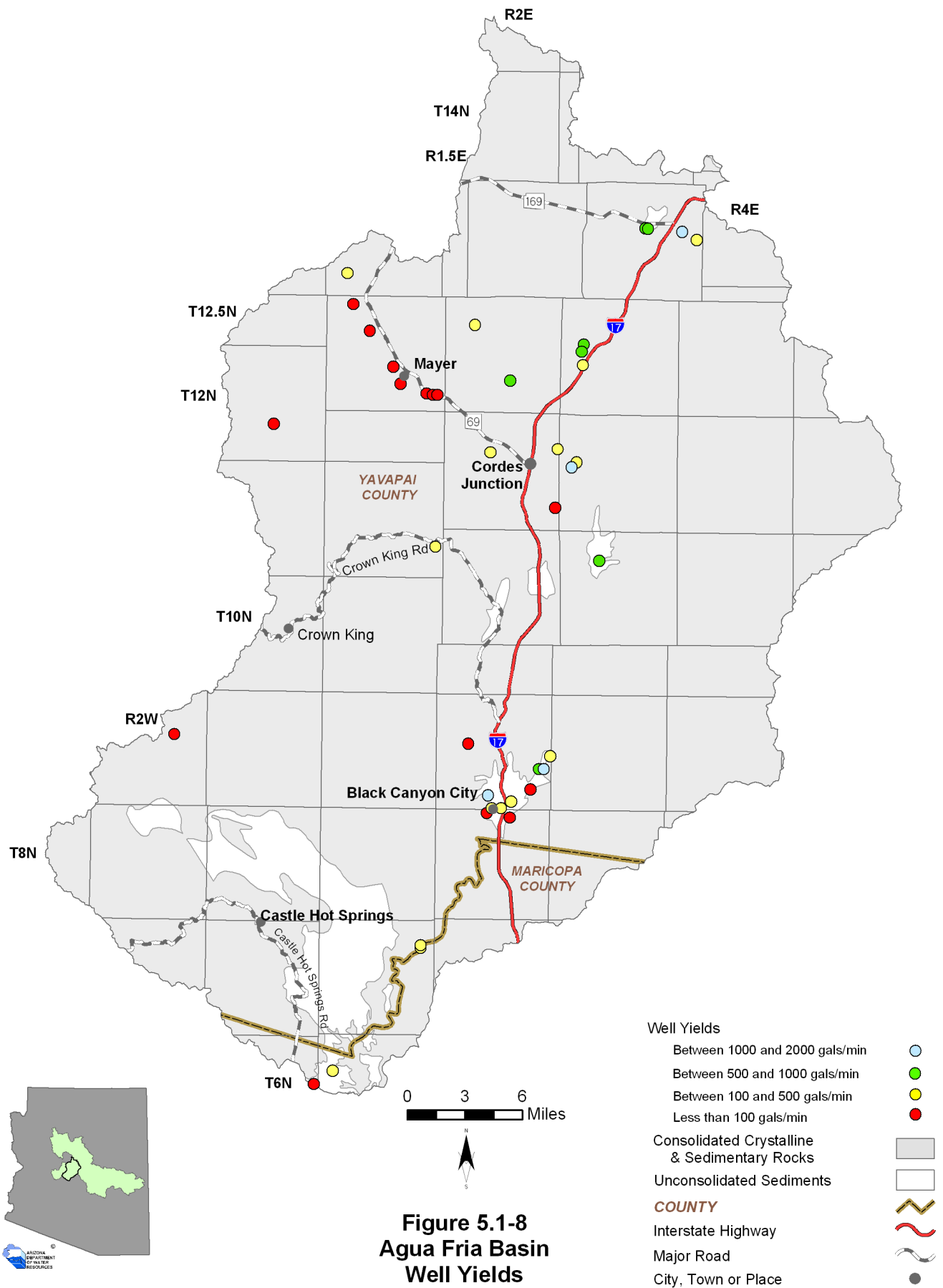


Figure 5.1-7
Agua Fria Basin
Hydrographs Showing Depth to Water in Selected Wells





5.1.7 Water Quality of the Agua Fria Basin

Wells, springs and mine sites with parameter concentrations that have equaled or exceeded drinking water standard(s), including location and parameter(s) are shown in Table Table 5.1-7A. Impaired lakes and streams with site type, name, length of impaired reach, area of impaired lake, designated use standard and parameter(s) exceeded is shown in Table 5.1-7B. Figure 5.1-9 shows the location of water quality occurrences keyed to Table 5.1.7. A description of water quality data sources and methods is found in Volume 1, Section 1.3.18. Not all parameters were measured at all sites; selective sampling for particular constituents is common.

Wells, Springs and Mines

- Refer to Table 5.1-7A.
- Forty-nine well and spring sites have parameter concentrations that have equaled or exceeded drinking water standards
- The drinking water standard most frequently equaled or exceeded in the sites measured was arsenic.
- Other standards equaled or exceeded include cadmium, fluoride and radionuclides.

Lakes and Streams

- Refer to Table 5.1-7B.
- Water quality standards were exceeded in a 21 mile reach of Turkey Creek from an unnamed tributary to Poland Creek.
- The standards exceeded were cadmium, copper, lead and zinc.
- Turkey Creek is not part of the ADEQ Total Maximum Daily Load program at this time.

Table 5.1-7 Water Quality Exceedences in the Agua Fria Basin¹

A. Wells, Springs and Mines

Map Key	Site Type	Site Location			Parameter(s) Concentration has Equaled or Exceeded Drinking Water Standard (DWS) ²
		Township	Range	Section	
1	Spring	14 North	2 East	23	As
2	Spring	14 North	2 East	32	As
3	Spring	13 North	1 East	28	As
4	Well	13 North	2 East	12	As
5	Well	13 North	2 East	14	As
6	Spring	13 North	2 East	24	As
7	Well	13 North	2 East	33	As
8	Well	13 North	3 East	9	As
9	Well	13 North	3 East	14	As
10	Well	12 North	1 East	9	As
11	Well	12 North	1 East	26	As
12	Well	12 North	1 East	29	As
13	Well	12 North	1 East	36	As
14	Spring	12 North	2 East	17	As
15	Spring	12 North	3 East	35	As
16	Well	11 North	2 East	31	As
17	Well	9.5 North	2 East	26	As
18	Well	9 North	2 East	21	As
19	Well	9 North	2 East	27	F
20	Well	9 North	2 East	27	F
21	Well	9 North	2 East	27	As
22	Well	9 North	2 East	28	F
23	Well	9 North	2 East	28	F
24	Well	9 North	2 East	28	F
25	Well	9 North	2 East	28	As, F
26	Well	9 North	2 East	33	As
27	Well	9 North	2 East	34	As
28	Well	9 North	2 East	35	As
29	Well	9 North	2 East	35	As
30	Well	9 North	2 East	35	As
31	Well	9 North	2 East	35	As
32	Well	8 North	2 East	2	Rad
33	Well	8 North	2 East	4	As
34	Well	10 North	1 West	14	As
35	Well	10 North	1 West	15	Cd
36	Well	10 North	1 West	15	Cd
37	Well	10 North	1 West	15	Cd
38	Well	9 North	2 West	25	As
39	Well	8 North	1 West	4	As
40	Spring	8 North	1 West	14	As
41	Spring	8 North	1 West	25	As
42	Spring	8 North	1 West	33	As, F
43	Spring	8 North	1 West	33	F
44	Well	8 North	1 West	33	As, F
45	Spring	8 North	2 West	27	As
46	Well	8 North	3 West	13	As, Rad
47	Well	7 North	1 West	4	F
48	Spring	7 North	1 West	22	F
49	Spring	7 North	1 West	22	F

Table 5.1-7 Water Quality Exceedences in the Agua Fria Basin (cont'd)¹

B. Lakes and Streams

Map Key	Site Type	Site Name	Length of Impaired Stream Reach (in miles)	Area of Impaired Lake (in acres)	Designated Use Standard ³	Parameter(s) Exceeding Use Standard ²
a	Stream	Turkey Creek - unnamed tributary to Poland Creek	21	NA	A&W	Cd, Cu, Pb, Zn

Notes:

¹ Water quality samples collected between 1978 and 2003.

²As = Arsenic

Cd = Cadmium

Cu = Copper

F= Fluoride

Pb = Lead

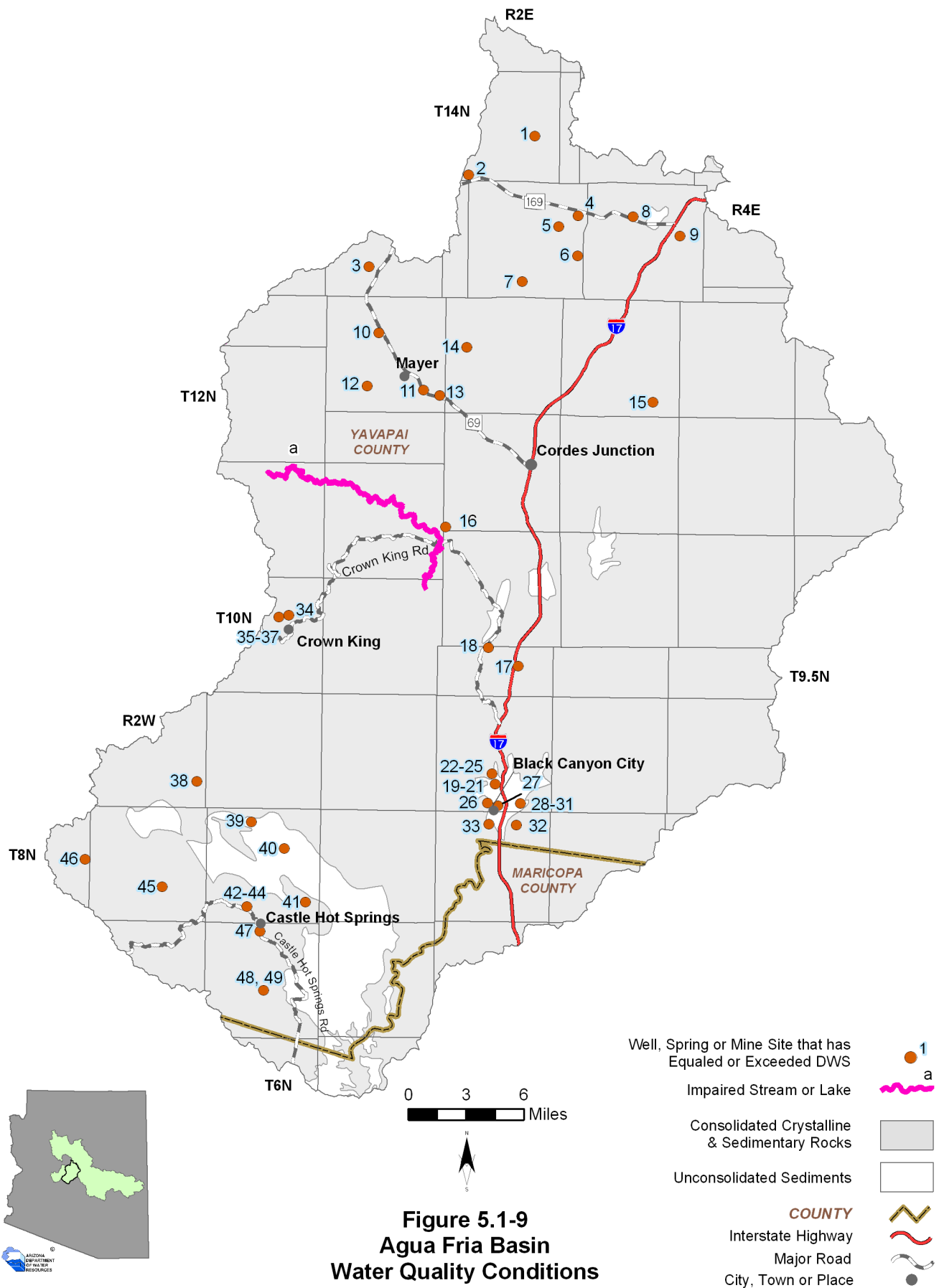
Rad = One or more of the following radionuclides - Gross Alpha, Gross Beta, Radium, and Uranium

Zn = Zinc

³A&W = Aquatic and Wildlife

FBC = Full Body Contact

NA = Not available



5.1.8 Cultural Water Demands in the Agua Fria Basin

Cultural water demand data including population, number of wells and the average well pumpage and surface water diversions by the municipal, industrial and agricultural sectors are shown in Table 5.1-8. Effluent generation including facility ownership, location, population served and not served, volume treated, disposal method and treatment level is shown in Table 5.1-9. Figure 5.1-10 shows the location of demand centers. A description of cultural water demand data sources and methods is found in Volume 1, Section 1.3.5. More detailed information on cultural water demands is found in Section 5.0.7.

Cultural Water Demands

- Refer to Table 5.1-8 and Figure 5.1-10.
- Population in this basin increased from 2,839 people in 1980 to 9,025 in 2003. Projections suggest a slower growth rate through 2050 to 20,220.
- Groundwater use has increased since 1971, with an average of 2,000 acre-feet per year from 1971-1975 and an average of 3,400 acre-feet pumped per year from 2001-2003. The highest average annual groundwater use, 5,000 acre-feet per year, occurred during 1981-1985.
- There are no reported surface water diversions in this basin.
- Municipal groundwater demand increased from an average of 1,100 acre-feet per year in 1991-1995 to an average of 1,800 acre-feet per year in 2001-2003.
- Agricultural demand has increased slightly from an average of 1,300 acre-feet per year in 1991-1995 to an average of 1,600 acre-feet per year in 2001-2003.
- No industrial groundwater demand was reported for this basin.
- Most municipal and industrial demand is found in the vicinity of Black Canyon City, Cordes Junction and Mayer.
- There are numerous small agricultural demand areas north and east of Cordes Junction.
- The basin contains two small mines or quarries, one northwest of Mayer and the other northeast of Castle Hot Springs.
- As of 2003 there were 1,688 registered wells with a pumping capacity of less than or equal to 35 gallons per minute and 159 wells with a pumping capacity of more than 35 gallons per minute.

Effluent Generation

- Refer to Table 5.1-9.
- This basin contains three wastewater treatment facilities.
- Information on population served, effluent generation and disposal was available for two facilities. These facilities serve almost 300 people and generate 22 acre-feet of effluent per year.

Table 5.1-8. Cultural Water Demands in the Agua Fria Basin¹

Year	Recent (Census) and Projected (DES) Population	Number of Registered Water Supply Wells Drilled		Average Annual Demand (in acre-feet)						Data Source		
				Well Pumpage			Surface-Water Diversions					
		Q ≤ 35 gpm	Q > 35 gpm	Municipal	Industrial	Irrigation	Municipal	Industrial	Irrigation			
1971		859 ²	127 ²	2,000			NR			ADWR (1994)		
1972												
1973				3,000			NR					
1974												
1975												
1976												
1977												
1978				5,000			NR					
1979												
1980	2,839											
1981	3,086	151	5	4,000			NR					
1982	3,334											
1983	3,581											
1984	3,829											
1985	4,076											
1986	4,323	138	11	1,100			NR					
1987	4,571											
1988	4,818											
1989	5,066											
1990	5,313											
1991	5,603	142	3	1,500	NR	1,300	NR					
1992	5,892											
1993	6,182											
1994	6,472											
1995	6,762											
1996	7,051	205	4	1,800	NR	1,600	NR					
1997	7,341											
1998	7,631											
1999	7,920											
2000	8,210											
2001	8,482	94	5				NR					
2002	8,754											
2003	9,025											
2010	10,928											
2020	13,389											
2030	15,287											
2040	17,213											
2050	20,220											

ADDITIONAL WELLS:³ 99 4
TOTAL WELLS: 1,688 159

Notes:

NR - Not reported

¹ Does not include evaporation losses from stockponds and reservoirs.

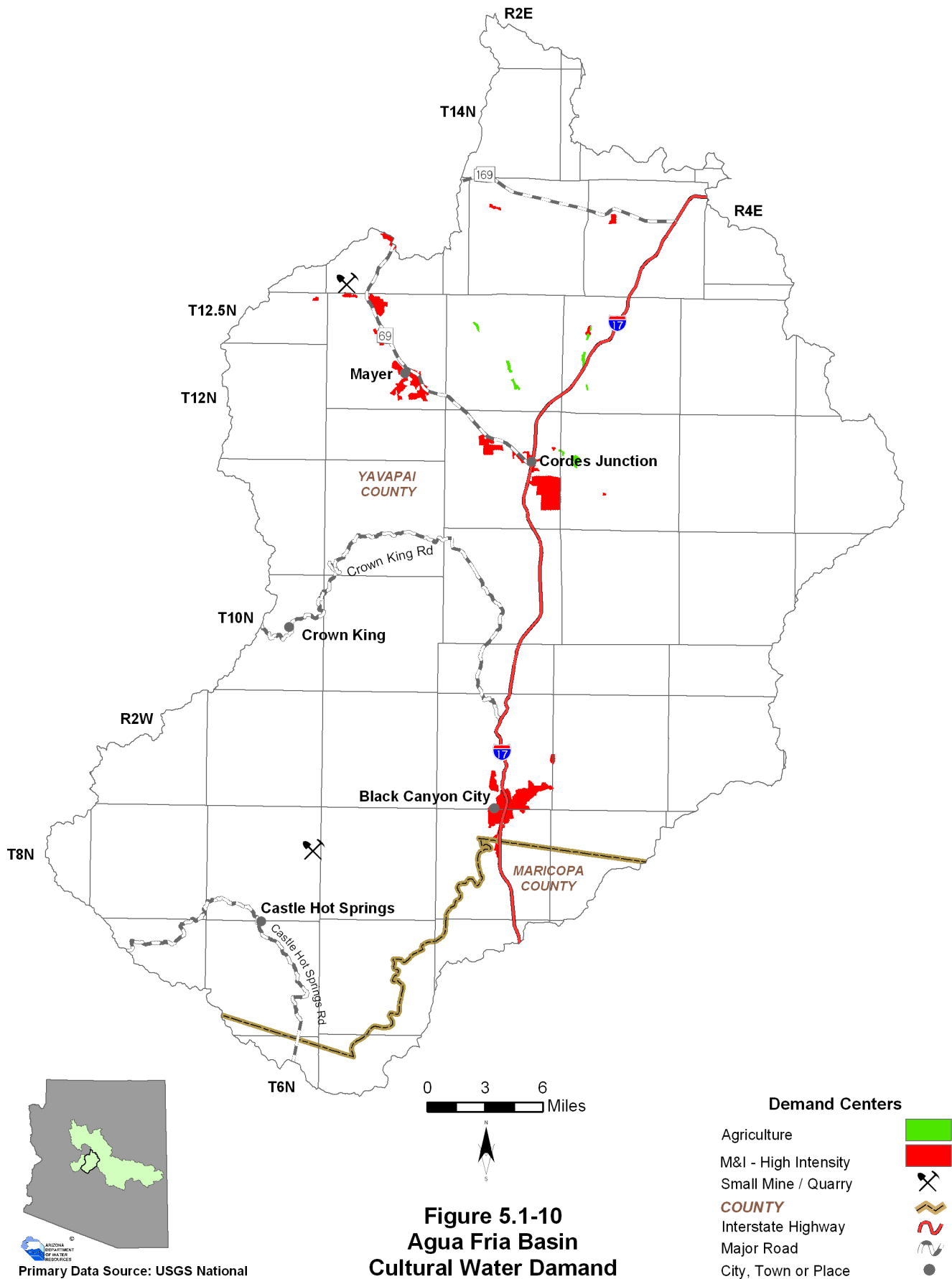
² Includes all wells through 1980.

³ Other water-supply wells are listed in the ADWR Well Registry for this basin, but they do not have completion dates. These wells are summed here.

Table 5.1-9 Effluent Generation in the Agua Fria Basin

Facility Name	Ownership	City/Location Served	Population Served	Volume Treated/Generated (acre-feet/year)	Disposal Method					Current Treatment Level	Population Not Served	Year of Record
					Water-course	Evaporation Pond	Irrigation	Wildlife Area	Golf Course	Discharge to Another Facility	Infiltration Basin	
Arcosanti WWTF	Private	Arcosanti	273	21				NA			NA	1996
Crown King Work Center	Prescott NF	Site Facilities										
Kings Ranch Unit II	Private	Black Canyon City	19	>1	Agua Fria						NA	2003
Totals			292	22								

NA: Data not currently available to ADWR
WWTF: Wastewater Treatment Facility



5.1.9 Water Adequacy Determinations in the Agua Fria Basin

Water adequacy determination information including the subdivision name, location, number of lots, adequacy determination, reason for the inadequacy determination, date of determination and subdivision water provider are shown in Table 5.1-10. Figure 5.1-11 shows the locations of subdivisions keyed to the Table. A description of the Water Adequacy Program is found in Volume 1, Appendix A. Adequacy determination data sources and methods are found in Volume 1, Sections 1.3.1.

Water Adequacy Reports

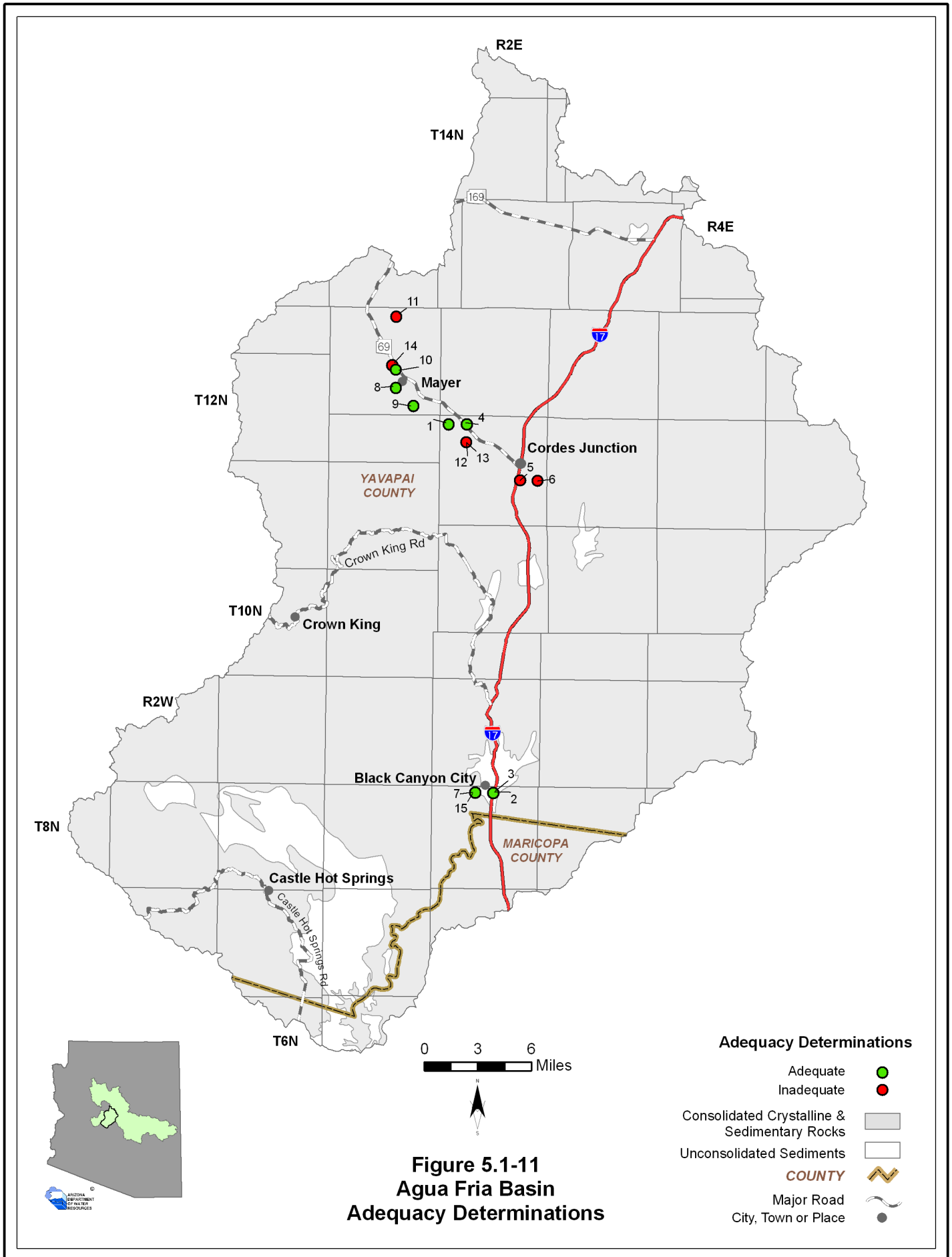
- See Table 5.1-10
- Fifteen water adequacy determinations have been made in this basin through May, 2005.
- Six determinations of inadequacy have been made; two near Cordes Junction and four along State Highway 69.
- All six determinations of inadequacy were because the applicant chose not to submit the necessary information, and/or the available hydrologic data was insufficient to make a determination. One inadequate determination also stated the existing supply was unreliable or physically unavailable or groundwater exceeds the depth-to-water criteria.
- All lots receiving an adequacy determination are in Yavapai County. Of the 1,177 lots in fourteen subdivisions for which lot information is available, 973 lots or 83% were determined to be adequate.

Table 5.1-10. Adequacy Determinations in the Agua Fria Basin¹

Map Key	Subdivision Name	County	Location			No. of Lots	ADWR File No. ²	ADWR Adequacy Determination	Reason(s) for Inadequacy Determination ³	Date of Determination	Water Provider at the Time of Application
			Township	Range	Section						
1	Bensch Ranch Estates	Yavapai	11 North	2 East	6	411	22-400479	Adequate		02/26/01	Bradshaw Mountain View Water Company
2	Black Canyon Estates	Yavapai	8 North	2 East	3, 4	NA		Adequate		01/26/76	Trail's End Water Service
3	Black Canyon Estates # 2	Yavapai	8 North	2 East	3, 4, 9	142		Adequate		08/20/84	Trail's End Water Service
4	Bradshaw Overlook	Yavapai	11 North	2 East	5, 8	23		Adequate		01/22/90	Bradshaw Mountain View Water Company
5	Cordes Lakes	Yavapai	11 North	2 East	23, 24, 25, 26	101		Inadequate	A1	05/16/86	Cordes Lakes Water Company
6	Cordes Lakes # 8	Yavapai	11 North	2 East	24	7		Inadequate	A1	06/19/86	Cordes Lakes Water Company
7	Kings Ranch Units	Yavapai	8 North	2 East	4, 9	142		Adequate		01/26/76	Trail's End Water Service
8	Mayer Estates	Yavapai	12 North	1 East	27	163		Adequate		01/07/76	Mayer Water Company
9	Oak Hills	Yavapai	12 North	1 East	35	18		Adequate		07/14/94	Mayer Domestic Water Imp District
10	Quail Hollow # 1	Yavapai	12 North	1 East	22	50		Adequate		04/19/90	Mayer Water Company
11	Rancho Vista Estates LLC	Yavapai	12 North	1 East	3, 4	58		Inadequate	A1, A2	02/22/95	Dry Lot Subdivision
12	Spring Valley # 3	Yavapai	11 North	2 East	8	18		Inadequate	A1	02/20/81	Bradshaw Mountain View Water Company
13	Spring Valley # 4	Yavapai	11 North	2 East	8	5		Inadequate	A1	09/16/85	Bradshaw Mountain View Water Company
14	Sunrise Estates	Yavapai	12 North	1 East	22	15	22-400244	Inadequate	A1	02/11/00	Mayer Domestic Water Improvement District
15	Westridge	Yavapai	8 North	2 East	4	24		Adequate		09/17/87	Black Canyon City Water Association

Notes:

- ¹Each determination of the adequacy of water supplies available to a subdivision is based on the information available to ADWR and the standards of review and policies in effect at the time the determination was made.
² In some cases, ADWR might make a different determination if a similar application were submitted today, based on the hydrologic data and other information currently available, as well as current rules and policies.
³ Prior to February 1995, ADWR did not assign file numbers to applications for adequacy determination.
- A. Physical/Continuous
- 1) Insufficient Data (applicant chose not to submit necessary information and/or available hydrologic data insufficient to make determination)
 - 2) Insufficient Supply (existing water supply unreliable or physically unavailable for groundwater, depth-to-water exceeds criteria)
 - 3) Insufficient Infrastructure (distribution system is insufficient to meet demands or applicant proposed water hauling)
- B. Legal (applicant failed to demonstrate a legal right to use the water or failed to demonstrate the provider's legal authority to serve the subdivision)
- C. Water Quality
- D. Unable to locate records



Agua Fria Basin

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